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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/671,002	09/27/2000	Brian Dennis McKean	SJ09-2000-0068US1	6634

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EXAMINER

BAKER, PAUL A

ART UNIT

PAPER NUMBER

2187

DATE MAILED: 04/25/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/671,002	MCKEAN ET AL.
	Examiner Paul A Baker	Art Unit 2187

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 27 September 2000.

2a) This action is FINAL. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-26 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 1-26 is/are rejected.

7) Claim(s) _____ is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on 27 September 2000 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.

12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:

1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) The translation of the foreign language provisional application has been received.

15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____.
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.	6) <input type="checkbox"/> Other: _____

DETAILED ACTION

Claims 1-26 are presented for examination.

Information Disclosure Statement

Receipt is acknowledged of information disclosure statement filed on 12 January 2001, which the statement has been placed of record in the file. Information disclosed and listed on PTO 1449 was considered.

Drawings

Figures 1-3 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "228 of Figure 2" has been used to designate both the DASD platter and a portion of the arm assembly. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: Figure 3: elements 338, 360, 366, and 368; Figure 4: elements 400, 420; Figure 5 element 500, Figure 6 element 600. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are

required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: Figure 3 element 318 disclosed on page 14 line 18 of the specification. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

The use of the label 520 in Figure 5 is discouraged since this number is also used as an example length of sector size within the specification and could lead to confusion.

In Figure 5 a decision box should be placed beneath element 530 since elements 540 and 550 are not performed in parallel and are executed upon determination of the RAID level employed by the disk array subsystem.

Specification

Page 13 line 18 of the specification "The transducers 36 are attached" should be "The transducers 236 are attached".

The use of the term "digital array storage device(s)" is discouraged since this has the same acronym as "direct access storage device(s)" (DASD) as also defined within the specification and could lead to confusion.

The term "re-laying" is not adequately defined within the specification, this is of particular importance since this term is used within applicant's claims.

The applicants should provide a definition of the term "52x" within the specification.

Claim Objections

Claims 3, 8, 16, and 21 are objected to because of the following informalities: The term "re-laying" should be defined in the claim or specifications. For the purpose of examination the term "re-laying" will be construed to mean "the rearrangement of data within and between drives with no substantive changes to said data" (ie the term "re-laying" infers no change in sector size while migration does). A possible replacement term is "reconfiguration" as disclosed and defined in Schultz et al US Patent 6,058,489. Appropriate correction is required.

Claim 15 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. In both claim 14 and 15 the "at least one drive" is formatted in a second format type, there is no patentable difference between the two claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5,7,14-18, 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schultz et al US Patent 6,058,489 in view of Ofer et al. US Patent 5,887,199.

In regards to claim 1, Schultz discloses adding at least one drive to a system controller that controls a predetermined number of storage devices arranged in a digital array storage device to form a system drive in column 2 lines 43-64. Schultz does not disclose the converting data in a first format type on the digital array of storage devices to a format of a second type on the added at least one drive. However, Ofer et al. discloses a disk array where each drive may have its own block size (format) in column 1 lines 48-58. Ofer discloses the benefits of maintaining a disk array where the disks have different formats as having flexibility and adaptability in column 1 lines 8-15. Since Schultz discloses the rearrangement of stripes of data when adding a drive in Figure 2A-2F, the conversion between formats would be required during this operation when the added disk would be of a different format. Therefore it would have been obvious to one skilled in the art at the time of invention to add a drive of one format to a disk array of a different format.

In regards to claim 2, Schultz and Ofer disclose the invention substantially as claimed. While neither Schultz nor Ofer explicitly disclose the formatting the drive in the second format type and then adding the drive to the array, it is well known in the art that a drive added to a computer system must be formatted before it can be used. Therefore, it would have been obvious to one skilled in the art to format the drive before adding it to the disk array.

In regards to claim 3, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the re-laying out data stored on the predetermined number of storage devices arranged in the digital array storage devices forming the system drive using the predetermined number of storage devices and the added first drive formatted in the second format type in Figure 2A-2F. Since Schultz discloses the addition of multiple drives in column 2 lines 51-53, the process shown in Figure 2A-2F could be performed by the addition of another drive as disclosed in claim 3 lines 6 through 9 and has been anticipated by Schultz. Therefore it would have been obvious to one skilled in the art at the time of invention to add another drive and migrate the data of first format type to second format type on the second drive.

In regards to claim 4, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the migration being performed by the system controller using a background process in Figure 5.

In regards to claim 5, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses data writes to both one of the predetermined number of storage devices and the added second drive during the migration performed by the background process in column 2 lines 45 through 49.

In regards to claim 7, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the migrating is performed by the system controller using a regeneration function when one of the predetermined number of storage devices fails before the migration has completed in column 22 lines 37-40.

In regards to claim 9, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the use of RAID 1 in column 2 lines 41-43 this RAID level provides a mirror of each drive, Since Ofer provides the possibility of drives having different formats in a disk array, it would have been obvious at the time of invention to select drives to create a mirror system where the mirror drive is of a second format.

In regards to claim 10, Schultz and Ofer disclose the invention substantially as claimed. In the creation of RAID 1 as disclosed by Schultz, the conversion of one format to another as disclosed by Ofer would be required when the mirror drive is of a different format. Therefore, it would have been obvious at the time of invention to copy data from the predetermined number of storage devices in a first format to the mirror drive in a second format.

In regards to claim 11, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the ability to perform writing to the disk array system during copying in column 2 lines 45-48.

In regards to claim 12, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the removal of a disk from the array in column 2 line 65 column 3 line 1.

In regards to claim 13, Schultz and Ofer disclose the invention substantially as claimed. Ofer further discloses drives with 512 or 520 bytes per sector in column 1 lines 59-62 and by the title "Mass storage controller with universal track size adaptability" indicates any sector (track) size is anticipated.

In regards to claim 14 and 15, Schultz discloses a plurality of storage devices forming a system drive formatted in a first format type in Figure 1 element 114E, and a system controller coupled to a plurality of storage devices for controlling the plurality of storage devices forming system drive in Figure 1 element 10. However Schultz does not disclose at least one drive formatted in a second format type, coupled to the system controller, wherein the system controller converts data in a first format type on a plurality of storage devices to a format of a second type on the at least one additional drive. Ofer discloses converting a first format type to another in column 1 lines 48-57. Ofer discloses the benefits of maintaining a disk array where the disks have different formats as having flexibility and adaptability in column 1 lines 8-15. Therefore, it would have been obvious at the time of invention to convert data in the first format type to data of a different format on a different drive.

In regards to claim 16, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the re-laying out data stored on the plurality of storage devices in Figure 2A-2F. Schultz discloses the addition of one or more drives in column 2 lines 51-53. Ofer discloses the conversion of one format to another in column 1 lines 48-58. In the migration, the conversion between formats would be required during this operation when the added disks would be of a different format. Therefore, it would have been obvious at the time of invention to add one or more drives of another format and migrate the data from the first format to the second format.

In regards to claim 17, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the migration being performed by the system controller using a background process in Figure 5.

In regards to claim 18, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses data writes to both one of the predetermined number of storage devices and the added second drive during the migration performed by the background process in column 2 lines 45 through 49.

In regards to claim 20, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the migrating is performed by the system controller using a regeneration function when one of the predetermined number of storage devices fails before the migration has completed in column 22 lines 37-40.

In regards to claim 22, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the use of RAID 1 in column 2 lines 41-43 this RAID level provides a mirror of each drive, Since Ofer provides the possibility of drives having different formats in a disk array, it would have been obvious at the time of invention to select drives to create a mirror system where the mirror drive is of a second format.

In regards to claim 23, Schultz and Ofer disclose the invention substantially as claimed. In the creation of RAID 1 as disclosed by Schultz, the conversion of one format to another as disclosed by Ofer would be required when the mirror drive is of a different format. Therefore, it would have been obvious at the time of invention to copy data from the predetermined number of storage devices in a first format to the mirror drive in a second format.

In regards to claim 24, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the ability to perform writing to the disk array system during copying in column 2 lines 45-48.

In regards to claim 25, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the removal of a disk from the array in column 2 line 65 column 3 line 1.

In regards to claim 26, Schultz and Ofer disclose the invention substantially as claimed. Ofer further discloses drives with 512 or 520 bytes per sector in column 1 lines 59-62 and by the title "Mass storage controller with universal track size adaptability" indicates any sector (track) size is anticipated.

Claims 6, 8, 19 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schultz in view of Ofer as applied to claims 3, 2, 16 and 15 above, and further in view of Stallmo et al. US Patent 5,875,456.

In regards to claim 6 and 19, Schultz and Ofer disclose the invention substantially as claimed. While neither Schultz nor Ofer disclose the removal of a drive after migration, then the addition of an additional drive of the second format with the migration from another drive to the added drive. More specifically neither Schultz nor Ofer disclose the serial operation of migration, removal, addition, and migration. Stallmo discloses the adding and/or deleting of disks from the managed set of disks in column 10 lines 6-11. Since Stallmo specifies the alternate and conjunctive forms he foresaw removal and addition of disks in one general operation in the same field of endeavor of disk array expansion and contraction. Given Stallmo's disclosure of

removing and adding disks in a general operation in the context of Schultz and Ofer, it would have been obvious at the time of invention to one skilled in the art to remove a drive after migration with the addition of another drive of the second format and the further migration to the additional drive.

In regards to claims 8 and 21, Schultz and Ofer disclose the invention substantially as claimed. While neither Schultz nor Ofer disclose the removal of a drive, reformatting the drive to a second format then the replacement into the array for reconstitution via regeneration function. In the instance of a soft failure of a drive in the system of a mixed format it would be obvious upon determination that the drive can be reused, to reformat the drive in the second format and add the drive to the array for reconstitution of the drive. Therefore it would have been obvious at the time of the invention to remove the drive, reformat the drive to the second format and reconstitute the drive using RAID parity information.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Rathunde US Patent 5,574,851, discloses the migration from one RAID level to another while the array remains online

Nakamura US Patent 5,388,013, discloses the migration from CKD format to FBA format.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul A Baker whose telephone number is (703)305-3304. The examiner can normally be reached on M-F 8am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Do Yoo can be reached on (703)308-4908. The fax phone numbers for the organization where this application or proceeding is assigned are (703)746-7238 for regular communications and (703)746-7240 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)305-3900.

PB
April 22, 2002

Do Hyun Yoo
DO HYUN YOO
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